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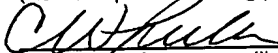
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A P P L I C A T I O N

Of

Alexander Bekker

For

UNITED STATES LETTERS PATENT

On

**IDENTIFICATION TAG AND
RELATED IDENTIFICATION TAG SYSTEM**

Docket No. PREDYN-44675

Sheets of Drawings: Eleven

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**IDENTIFICATION TAG AND
RELATED IDENTIFICATION TAG SYSTEM**

BACKGROUND OF THE INVENTION

This invention relates generally to improvements in identification appliances such as identification tags, and to a related system including means such as a wristband or bracelet or the like for convenient and comfortable mounting of an identification tag onto a selected wearer or object. More specifically, this invention provides an improved identification tag and related system designed particularly for use with a small wearer or object, such as an infant or small child, to provided a relatively extensive information-bearing surface area having a size sufficient to accommodate a range of important identification data in human readable and/or machine readable form, and further wherein the information-bearing area is relatively flat for facilitated and improved read-out of machine readable data.

Identification bands such as a wristbands or bracelets or other closed loop elements are generally known in the art, wherein the identification band bears or carries some form of information or data associated with the person wearing the band, or associated with the object to which the band is mounted or attached. Accordingly, the information carried by the identification band travels with the wearer. In a typical construction, e.g., for use as a wristband, an elongated flexible strap formed from flexible plastic or the like is wrapped about the wrist of an authorized wearer, and includes interfitting or interengageable securement members at opposite ends thereof for suitable interconnection to retain the identification band on the wearer's wrist. Identification information is applied to the band as by printing appropriate information directly onto an external band surface, or onto a label adhered to the band, or by printing such information onto a card or the like adapted for slide-fit mounting into a pocket formed within the band structure. Such identification bands have been widely used or proposed for use, e.g., for patient identification in a medical facility or the like,

for personnel identification and/or access control at secured facilities such as military or industrial installations and at prisons and the like, for patron identification at amusement parks and events such as concerts and the like, for airport passenger and/or baggage identification, for identification and tracking of shipped parcels, and for animal control, and the like. Exemplary identification bands of this general type are shown and described in U.S. Patents 4,221,063; 4,285,146; 4,318,234; 4,386,795; 5,226,809; 5,448,846; 5,457,906; 5,479,797; 5,493,805; 5,581,924; 5,609,716; 5,615,504; 5,740,623; 5,792,299; 5,799,426; 5,973,598; 5,973,600 and 5,979,941 which are incorporated by reference herein.

In recent years, improved identification systems including identification bands and tags have been designed to incorporate wearer-related data in machine readable form, in lieu of or in addition to human readable data which is typically limited to printed or hand-written alphanumeric characters. In one form, such machine readable information may comprise data printed onto or otherwise carried by the flexible strap in linear bar code form or the like, and arrayed for scanning by a conventional bar code reader or the like. See, for example, U.S. Patents 5,448,846; 5,799,426; and 5,615,504. See also U.S. Patents 6,016,618; and 6,510,634. In another form, such machine readable information may comprise a radio frequency identification (RFID) circuit or chip mounted on or within the flexible strap and adapted to receive and store selected wearer-related information for appropriate wireless communication with a remote reader. For illustrative examples of identification bands and the like including RFID technology, see U.S. Patent Nos. 5,493,805; 5,973,598; 5,973,600; 6,181,287; and 6,414,543, and copending U.S. Serial No. 10/101,219, which are also incorporated by reference herein.

Identification bands including machine readable data may beneficially incorporate a broad range of wearer-related information such as detailed biometric information when used on a patient in a medical facility, wherein the range and scope of such machine readable data may far exceed the practical space limitations on the band for receiving the same data in

conventional human readable format. In other words, machine readable data technologies have permitted a substantial increase in the volume and scope of wearer-related data that can be applied to and/or carried by the identification band, as compared to conventional prior art bands bearing information only in human readable form. In a patient identification system, e.g., the identification band may bear or carry basic patient name data and the like in human readable characters, and also carry a broad scope of the same and additional information regarding patient name, age, sex, address, medical condition, allergies, and/or treatment regimen in machine readable form.

Despite the benefits and advantages derived from the incorporation of machine readable information on or within a flexible identification band, practical implementation of machine readable technologies has been accompanied by a number of significant drawbacks and disadvantages. More particularly, some forms of machine readable data such as linear bar coding requires a relatively flat surface for accurate and reliable read-out by means of a bar code reader. However, an identification band such as a wristband or ankle bracelet or the like mounted onto an individual inherently exhibits a curved configuration. While the degree of band curvature and resultant distortion of the bar coded information may be insufficient to interfere with data read-out, when the band is mounted onto an adult of average size, this is often not the case with relatively small identification bands sized to fit a small person such as an infant or small child. In addition, the band curvature may also impact the transmission or broadcast range of an RFID circuit for communication with a remote reader, wherein such communication with the RFID circuit can be significantly impaired in the case of small-sized bands suitable for an infant or small child.

Moreover, for small-sized identification bands dimensioned for wearer comfort, the band width may provide inadequate surface area for receiving human readable information in a size suitable for quick and easily visual reading, or for receiving machine readable bar coded information having a size suitable for facilitated read-out by means of a bar code reader.

Similarly, small-sized identification bands may be too small for conveniently carrying and supporting an RFID circuit or chip.

5 In addition, current identification bands for bearing or carrying
wearer-related information in human readable or machine readable form are
typically constructed from relatively stiff plastic-based materials designed to
provide a sturdy and durable substrate suitable for permanent imprinting of
information thereon, and/or for protectively supporting an RFID circuit or chip.
As a result, such identification bands tend to be relatively stiff, exhibit
relatively abrasive and sharp edges, and thus can be somewhat
10 uncomfortable for a user to wear over an extended period of time. Further,
while such identification bands are frequently designed for encasing or
protecting printed information and/or an RFID circuit against damage
attributable to water intrusion, band bending and flexing associated with
looped securement about a wearer's wrist or the like in combination with
15 additional bending and flexing during a normal usage cycle often causes the
edges of the band to wrinkle and separate, thereby undesirably admitting
water into the band interior. Such water intrusion can cause printed
information to smear and distort in a manner that renders the printed
information unreadable, and/or causes damage to the encased RFID circuit.

20 There exists, therefore, a need for further improvements in and to
identification bands and related identification systems of the type carrying
wearer-related information, particularly wherein a relatively flat information-
bearing surface of relatively extensive area is provided with an identification
strap or band which may have a relatively small size suitable for use with a
25 small infant or child, or small object. The present invention fulfills these
needs and provides further related advantages.

SUMMARY OF THE INVENTION

30 In accordance with the invention, an identification tag and related
tag system are provided for securely mounting the identification tag onto a
selected wearer or object, such as mounting onto a wearer's wrist or the like.

The identification tag comprises a relatively compact, substantially planar structure adapted to receive wearer-related identification and other information in human readable and/or machine readable form. This information-bearing tag is adapted for quick and easy assembly onto an elongated flexible strap or band such as a wristband or bracelet for mounting onto the selected wearer or object. In one preferred form, the identification tag incorporates a radio frequency identification (RFID) circuit adapted for communicating wearer-related information with a remote reader. The tag system, including the identification tag assembled with the flexible strap, is particularly useful with a small wearer or object, such as an infant or small child, to provided a relatively extensive and relatively flat information-bearing surface area.

In a preferred form, the identification tag bears printed human readable identification data, such as basic information regarding the wearer, e.g., name, address, and the like. In addition, the identification tag bears or carries at least some wearer-related information in machine readable form, such as by printing data onto the tag in bar code format. In addition or in the alternative, machine readable information may be inputted to an RFID circuit formed on or carried by the identification tag. This identification tag may be provided as a unitary item suitable for processing through an appropriate print station or stations or the like including means for inputting the identification data in the various formats to the tag. Alternately, the identification tag may be provided in detachable form in elongated roll or sheet form for processing through one or more appropriate print stations. In each configuration, the identification tag is constructed from a printable and sufficiently stiff substrate material suitable for retaining a substantially flat or planar shape.

The identification tag is formed for quick and easy assembly with the flexible strap or band, which is preferably constructed from a lightweight and inexpensive material such as a vinyl-based plastic chosen for substantially optimized comfort when worn about the wrist or ankle or the like of an individual. In one form, the identification tag includes a pair of spaced-

apart and generally parallel strap slots for quick and easy slide-fit assembly onto the flexible strap, prior to wrapping the strap about the wrist or the like of a specific wearer and appropriate engagement of a fastening element or elements to retain the strap in a closed loop configuration on the wearer. In accordance with one important aspect of the invention, the identification tag is mounted on the exterior of the strap, and defines an information-bearing surface having a relatively extensive surface area with a width exceeding the strap width. The overall size and shape of the identification tag, and its orientation relative to the strap when mounted thereon, is selected so that at least a substantial portion of the tag sufficiently retains its substantially planar shape for facilitated and reliable read-out of machine readable wear-related information, as by means of a bar code reader and/or by wireless communication of the RFID circuit with a remote reader.

In one form of the invention, the identification tag is provided on one portion of a form sheet, another portion of which includes a plurality of associated adhesive labels each adapted for receiving and bearing human readable and/or machine readable information associated with the wearer-related information applied to the identification tag. In a related alternative form, the identification tag may further incorporate one or more detachable adhesive labels each bearing or carrying wearer-related information in human readable and/or machine readable form, wherein the identification tag with labels is adapted for mounting as a unit onto a flexible strap or band. In either configuration, each detachable label can be separated when and as needed for affixation to other objects associated the wearer, such as a vial containing a patient fluid specimen.

In another alternative preferred form, multiple identification tags are provided in roll or sheet form, and in related sets adapted for bearing or carrying appropriate wearer-related identification information, with each pair of tags being suitably sized and shaped for mounting onto the wrist or ankle or the like of a mother and infant, respectively, in a medical facility environment.

In a further alternative preferred form, multiple identification tags may be assembled with a single flexible strap used for mounting the multiple tags onto a single wearer. Each identification tags, or selected ones of the multiple identification tags may be colored coded, e.g., to indicate one or more selected conditions such as a particular medical condition associated with a specific patient or the like.

Other features and advantages of the present invention will become more apparent from the following detailed description, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIGURE 1 is a perspective view illustrating an identification tag constructed in accordance with the present invention mounted onto a wristband or the like and shown worn on a person's wrist;

FIGURE 2 is a plan view of the identification tag shown in FIG. 1, with portions broken away to illustrate internal construction details;

FIGURE 3 is an enlarged plan view depicting the identification tag of FIGS. 1 and 2 slidably mounted onto a wristband or the like;

FIGURE 4 is a plan view showing an elongated strip comprising plurality of identification tags corresponding with the identification tag of FIGS. 1 and 2, depicting the plural identification tags detachably interconnected in end-to-end relation;

FIGURE 5 is an enlarged fragmented sectional view taken generally on the line 5-5 of FIG. 4;

FIGURE 6 is a perspective view showing the elongated strip of FIG. 4 provided in roll form;

FIGURE 7 is a fragmented plan view similar to FIG. 4, but illustrating an elongated strip comprising a plurality of identification tags detachably interconnected in side-by-side relation;

5 FIGURE 8 is a perspective view showing a dispenser for dispensing successive identification tags of the type illustrated in FIGS. 1-7, and further wherein the dispenser may incorporate means for applying information in human readable and/or machine readable form to each dispensed identification tag;

10 FIGURE 9 is a perspective view similar to FIG. 1, but showing an identification tag constructed in accordance with an alternative preferred form of the invention, mounted onto a wristband or the like and shown worn on a person's wrist;

FIGURE 10 is a plan view of the identification tag shown in FIG. 9, with portions broken away to illustrate internal construction details;

15 FIGURE 11 is an enlarged plan view depicting the identification tag of FIGS. 9 and 10 slidably mounted onto a wristband or the like;

FIGURE 12 is a plan view showing a plurality of identification tags corresponding with the identification tag of FIG. 1, depicting the plural identification tags detachably interconnected in end-to-end relation;

20 FIGURE 13 is a perspective view similar to FIG. 9, but depicting multiple identification tags of the type shown in FIGS. 9 and 10 mounted onto a wristband or the like and shown worn on a person's wrist;

FIGURE 14 is a plan view showing a sheet bearing a plurality of removable identification tags of the type shown in FIGS. 1 and 2;

25 FIGURE 15 is a plan view showing an elongated strip comprising adjoining and detachably interconnected groups of relatively larger and comparatively smaller identification tags for use, for example, by related a related adult and child, such as a mother and infant;

30 FIG. 16 is a plan view showing the larger and identification tags depicted in FIG. 15 respectively mounted onto a larger or adult-sized, and a smaller or child-sized wristband or the like.

FIG. 17 is a plan view illustrating an elongated strip comprising relatively larger and comparatively smaller adjoining identification tags of the type shown in FIGS. 15 and 16, but wherein the identification tags are arranged in an alternative configuration;

5 FIGURE 18 is a plan view similar to FIGS. 15 and 17, but wherein an elongated strip comprising larger and smaller adjoining identification tags are arranged in another alternative configuration;

10 FIGURE 19 is a plan view showing an elongated strip comprising a succession of detachably interconnected identification tags each incorporating a plurality of individually removable adhesive labels;

FIGURE 20 is an exploded perspective view illustrating construction details of each identification tag shown in FIG. 19;

FIGURE 21 is a plan view depicting the identification tag of FIGS. 19 and 20 slidably mounted onto a wristband or the like;

15 FIGURE 22 is a perspective view showing the identification tag and wristband of FIG. 21 worn on a person's wrist;

20 FIGURE 23 is a plan view similar to FIG. 19, but depicting an elongated strip comprising a succession of detachably interconnected identification tags with multiple adhesive labels in accordance with an alternative configuration;

FIGURE 24 is a perspective view illustrating a turnstile station incorporating a reader for reading information on one of the identification tags of the present invention;

25 FIGURE 25 is a front elevation view showing a printable form including at least one identification tag disposed on a first portion of the form, and a plurality of adhesive labels formed on a second portion of the form;

FIGURE 26 is a rear elevation view of the printable form shown in FIG. 25;

30 FIGURE 27 is an exploded sectional view taken generally on the line 27-27 of FIG. 25;

FIGURE 28 is a front elevation view of a first identification tag separated from the printable form of FIGS. 25-27;

FIGURE 29 is a perspective view of a second identification tag separated from the printable form of FIGS. 25-27;

FIGURE 30 is an enlarged plan view depicting the identification tag of FIG. 28 slidably mounted onto a wristband or the like;

5 FIGURE 31 is an enlarged plan view depicting the identification tag of FIG. 29 slidably mounted onto a wristband or the like;

FIGURE 32 is depicting construction details of the printable form of FIG. 25-27;

10 FIGURE 33 is a front elevation view of another alternative preferred form, illustrating a modified printable form including at least one identification tag disposed on a first portion of the form, and a plurality of adhesive labels formed on a second portion of the form;

FIGURE 34 is an exploded sectional view taken generally on the line 34-34 of FIG. 33;

15 FIGURE 35 is perspective view of an identification tag separated from the printable form of FIGS. 33-34;

FIGURE 36 is a further perspective of the identification tag of FIG. 35;

20 FIGURE 37 is an exploded sectional view similar to FIG. 34, but depicting another modified printable form;

FIGURE 38 is a front elevation view of another alternative preferred form, illustrating a further modified printable form including at least one identification tag disposed on a first portion of the form, and a plurality of adhesive labels formed on a second portion of the form;

25 FIGURE 39 is an exploded sectional view taken generally on the line 39-39 of FIG. 38;

30 FIGURE 40 is front elevation view of yet another alternative preferred form, illustrating a further modified printable form including at least one identification tag disposed on a first portion of the form, and a plurality of adhesive labels formed on a second portion of the form;

FIGURE 41 is an exploded sectional view taken generally on the line 41-41 of FIG. 40;

FIGURE 42 is an exploded sectional view similar to FIG. 41, but depicting another modified printable form;

FIGURE 43 is an exploded perspective view illustrating a further modified printable form representing yet another alternative preferred form of the invention; and

FIGURE 44 is a front elevation view showing another modified printable form comprising a further preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in the exemplary drawings, an improved identification tag system referred to generally in FIGURES 1 and 3 by the reference numeral 10 is provided for mounting onto a selected person or specified object, such as by mounting about the wrist 12 (FIG. 1) of an authorized wearer. The identification tag system 10 comprises an identification tag 14 in the form of a relatively compact, substantially planar structure adapted to receive wearer-related identification and other information in human readable and/or machine readable form. This information-bearing identification tag 14 is adapted for quick and easy assembly onto an elongated flexible strap or band 16 such as a wristband or bracelet or the like for mounting onto the selected wearer or object. This identification tag system 10, including the identification tag 14 assembled with the flexible strap 16, is particularly useful with but not limited to a small wearer or object, such as an infant or small child, to provided a relatively extensive and relatively flat information-bearing surface area, while permitting the strap 16 to be constructed from a relatively soft and compliant material selected for substantially optimized comfort.

The identification tag 14 is shown in one preferred form in FIGS. 1-3, and generally comprises a relatively stiff and generally rectangular structure having smoothly rounded corners for user comfort. This tag 14 is constructed from a suitable material for receiving and bearing printed information applied thereto in human readable and/or machine readable form. FIG. 3 depicts human readable information 18 wearer name, address,

identification numbers, etc., imprinted on a left-hand side (as viewed in FIG. 3) of the tag 14, in combination with machine readable information such as linear or matrix bar code 20 imprinted on a right-hand side of the tag 14. Such bar coding 20 may represent a wide range of wearer-related data, including but not limited to duplication of the human readable information 18, together with additional data such as patient condition, treatment regimen, etc., when the tag system 10 is used as a patient identification bracelet. The bar coding 20 is adapted for quick and easy read-out by means of a conventional bar code reader (not shown in FIGS. 1-3).

In one preferred form, the identification tag 14 has a multi-ply construction which may include a laminate of paper, synthetic paper, and/or plastic materials such as polyester and textured polyethylene and the like. With such construction, the identification tag 14 has a relatively stiff but somewhat flexible or compliant structure providing a relatively sturdy and durable substrate for receiving, bearing, and/or supporting the wearer-related information applied thereto, as by means of conventional printer technology. In one form, the tag 14 may be surface-treated for thermal sensitivity, so that the wearer-related information 18, 20 may be printed thereon by means of a thermal-type printer. In another form, other types of printers including but not limited to laser printers and the like may be used. In some forms, the printed information may be applied directly to an external surface of the tag 14, whereas in other forms the tag 14 may incorporate an transparent cover layer for overlying and protecting an internal ply having the printed information applied thereto. Persons skilled in the art will recognize and appreciate that a wide range of different materials and constructions, and related production methods, may be used to form the identification tag 14.

FIG. 2 depicts a radio frequency identification (RFID) circuit 22 incorporated into the identification tag 14, as by embedding a communication circuit or chip or the like within the tag 14 in a position protectively encased between multiple plies forming the tag. This RFID circuit 22 is adapted for receiving and storing a broad range of potentially detailed wearer-related information, for appropriate wireless communication with a remote reader

(also not shown in FIGS. 1-3). For illustrative examples of identification bands and the like including RFID technology, see U.S. Patent Nos. 5,493,805; 5,973,598; 5,973,600; 6,181,287; and 6,414,543, and copending U.S. Serial No. 10/101,219, which are incorporated by reference herein.

5 The thus-constructed identification tag 14 is adapted for quick and easy assembly onto the flexible strap 16, which in turn is adapted for quick and easy mounting onto the selected wearer or object. FIGS. 1-3 show the identification tag 14 to include a pair of spaced-apart and generally parallel strap slots 24 formed therein at respective positions located near or adjacent
10 opposite ends of the tag 14, wherein these slots 24 are sized and shaped for slide-fit reception of a free end of the flexible strap 16. The identification tag 14 can thus be slidably positioned along the length of the strap 16, with the imprinted wearer-related information 18, 20 borne or otherwise visibly displayed at an outboard side of the tag 14 for direct visual reading of the
15 human readable data 18, and for direct optical scanning of the machine readable data 20 such as bar code data, and/or for wireless communication with the RFID circuit.

 An opposite end of the flexible strap 16 typically includes or carries a fastening element or elements 26 adapted to receive and/or engage
20 structures such as one of a plurality of longitudinally spaced apertures 28 formed near the strap free end, for supporting and retaining the strap 16 in a closed loop configuration (FIG. 1) of selected size wrapped about the wearer's wrist 12 or the like. While the illustrative drawings (FIG. 3) show a pair of snap-fit type fastening elements 26 at the opposite end of the strap
25 16, for interengagement of these snap-fit elements 26 through a selected one of the strap apertures 28, a variety of different strap constructions and related fastening devices may be employed. In this regard, U.S. Patents 4,221,063; 4,285,146; 4,318,234; 4,386,795; 5,226,809; 5,448,846; 5,457,906; 5,479,797; 5,493,805; 5,581,924; 5,609,716; 5,615,504; 5,740,623; 5,792,299; 5,799,426; 5,973,598; 5,973,500; and 5,979,941, which are
30 incorporated by reference herein, disclose a range of different types of

fastening structures for quickly and easily retaining a flexible strap in a closed loop geometry of selected diametric size.

5 In accordance with one important aspect of the invention, the flexible strap 16 can be constructed from a lightweight, inexpensive, and highly flexible or compliant soft plastic material chosen for substantially optimized wearer comfort, substantially without encountering significant abrasion of the wearer's skin. That is, prior identification bands of the type designed for direct printing of wearer-related information thereon, and/or for protectively supporting an RFID circuit or chip, have exhibited a relatively stiff
10 construction defining edges that can be somewhat sharp and abrasive, resulting in an identification wristband or bracelet that can be uncomfortable for a user to wear over an extended period of time. By contrast, in the identification tag system 10 of the present invention, the flexible strap 16 does not bear wearer-related information printed directly thereon, does not
15 carry other cards or labels having wearer-related information printed thereon, and further does not define a structure for protectively receiving and supporting an RFID circuit or chip. Instead, such wearer-related information and the RFID circuit or chip are carried by the separately formed identification tag 14. Accordingly, the flexible strap 16 may be constructed
20 from an extremely soft and compliant, yet desirably stretch-resistant material, such as a soft vinyl-based plastic or the like chosen for substantially optimized wearer comfort.

25 In addition, in accordance with a further important aspect of the invention, the information-bearing identification tag 14 is mounted onto the exterior of the strap 16. The tag 14 is thus constructed with a size and shape defining an information-bearing outboard tag side having a surface area that extends beyond the width of the associated strap 16. As a result, the available information-bearing surface area on the identification tag 14 is sufficient to receive and carry a substantial amount of volume of wearer-
30 related data for quick and easy read-out by direct visual perception and/or by automated readers, yet the tag 14 may be assembled with a flexible strap 16 having a small size suitable for mounting onto a small person or object,

particularly such as an infant or small child, or otherwise having a strap width that exhibits minimal or insufficient surface area for bearing any significant volume of wearer-related data. In this regard, the width and length of a flexible strap sized for fitting about the wrist or ankle or the like of a newborn
5 infant of small child is generally insufficient for bearing a broad range of wearer-related information in a form that is quickly and easily readable by alternative means.

The relatively stiff identification tag 14 when mounted onto the flexible strap 16 sufficiently retains its nondeformed, substantially flat or
10 substantially planar shape to provide a localized strap zone of substantially or nearly planar shape, when the strap 16 is mounted in closed loop configuration onto the selected wearer. This localized flat or nearly flat zone thus presents the wearer-related information on the identification tag 14 with minimal or no curvature for quick, easy and reliable machine read-out of
15 printed machine readable data 20 as by means of a bar code reader, and/or wireless communication of the RFID circuit 22 with a remote reader. That is, the identification tag 14 is not bent sufficiently for directly following the high degree of curvature associated with a small diameter strap 16 mounted, for example, onto the wrist or ankle of a newborn infant or small child, wherein
20 such high degree of curvature can interfere with bar code read-out and/or impair the broadcast range of the RFID circuit 22. Importantly, however, the remainder of the soft and flexible strap 16 may exhibit the requisite high degree of curvature needed for secure strap retention on wearer, but in a highly comfortable manner.

The identification tag 14 can be provided as a single or unitary
25 component for processing through one or more printer stations for printing the wearer-related information thereon, and further wherein such printer station or stations may also include appropriate programming means for inputting the desired range of wearer-related data to the RFID circuit 22.
30 Alternately, for facilitated printing and programming, a supply or plurality of identification tags 14 may be provided in roll or sheet form for processing through one or more printer/programmer stations, such as the exemplary

print station 30 shown in FIG. 8, with each dispensed identification tag 14 being detachable from the roll or sheet for immediate assembly with an associated flexible strap 16 and mounting onto the specified person or object.

5 More particularly, in accordance with one preferred form, FIG. 4 illustrates an elongated tape or strip 32 of multiple identification tags 14 of the type shown in FIGS. 1-3, with the tags 14 interconnected end-to-end and separable from each other by means of perforations 34 or appropriate
10 intervening lines of weakness which may be pre-cut. FIG. 5 is a sectional view illustrating embedded positioning of the RFID circuit 22 within each tag 14, located between overlying and underlying multiple tag-forming plies. FIG. 6 shows the elongated tape or strip 32 arranged in the form of a roll 36
15 suitable for mounting into the print station 30 (FIG. 8) for individual inputting of the appropriate wearer-related information to each tag 14 in succession, which is then dispensed from the station 30 for detachment from the roll 36
20 and appropriate assembly with a flexible strap 16 (FIG. 3). Each identification tag 14 may include one or more locator ports 38 (FIG. 4) formed therein, to facilitate optically controlled advancement of the strip 32 and resultant printer/programmer processing through the print station 30 or the like. FIG. 7 illustrates an alternative or modified elongated tape or strip 132
25 having multiple identification tags 14 detachably interconnected in side-by-side relation, as opposed to the end-to-end configuration shown in FIGS. 4 and 6.

 FIGS. 9-12 show a modified version of the identification tag, wherein the modified tag is referred to by reference numeral 114, but wherein
25 components which are otherwise common in terms of structure or function to those shown and described in FIGS. 1-4 are indicated by common reference numerals. As shown, the identification tag 114 generally conforms to the embodiment of FIGS. 1-4, except that the rectangular-shaped tag is re-oriented so that its long dimension extends perpendicular to a long
30 dimension of an associated flexible strap 16, when the tag 114 is mounted onto the strap 16.

More particularly, the modified identification tag 114 shown in FIGS. 9-11 is constructed according to the above-described embodiment of FIGS. 1-3, to have a relatively stiff yet somewhat compliant and rounded-cornered structure defining a sturdy and durable substrate for receiving and supporting wearer-related data in both human readable form 18 and in machine readable form such as bar code data 20. In addition, the tag 114 may include an RFID circuit 22 (FIGS. 10-11) formed thereon or embedded therein and having the capacity to receive and store a broad range of wearer-related information. The tag 114 has a generally rectangular size and shape defined by a shorter dimension that is significantly less than a longer dimension. As shown, the tag 114 has a pair of spaced-apart slots 24 formed therein near one end thereof, for slide-fit reception of the flexible strap 16 therethrough. These slots 24 are shown formed generally in parallel with the long dimension of the tag 114, thereby orienting the tag 114 so that its long dimension extends generally perpendicular to a long dimension of an associated flexible strap 16. With this construction, the overall extensive information-bearing surface area defined by the tag 114 is retained, yet the localized strap zone of substantially or nearly planar shape defined by the shorter width of the tag 114 is substantially minimized for further enhanced user comfort. As shown best in FIG. 11, a significant proportion of the tag area thus extends laterally relative to the strap 16.

The modified identification tag 114 may also be provided as a single or unitary component, or in roll or sheet form comprising a plurality of detachable tags adapted for processing through one or more print stations 30 (FIG. 8) or the like, all as previously shown and described herein. FIG. 12 depicts the identification tags 114 in an elongated tape or strip 32 with interconnecting separable perforations 34 or the like. FIG. 12 also shows each identification tag 114 to include a locator port 38 formed therein, and/or a reflector strip 40 on an inboard or reverse side thereon, wherein these structures may be provided to facilitate optically controlled advancement of the strip 32 and resultant printer/programmer processing through the print station 30 or the like.

FIG. 13 shows a pair of identification tags 114 mounted onto a common flexible strap 16 on the wrist 12 or the like of a single wearer. In this regard, in those instances where a single identification tag 14 or 114 may provide insufficient data capacity for a specific application, a second or subsequent tag may be mounted onto the strap 16 for providing increased storage capacity of wearer-related information. These multiple identification tags may be attached to the band 16 at the same time, or sequentially over time as wearer-related information evolves, changes and/or requires updating. One or both of the tags may be color-coded as indicated by reference numeral 115, or otherwise bear one or more prominently visible markings, to provide a quick and easy visual indication of certain information, such as specific medical conditions (e.g., allergies, diabetes, etc.) when the band is worn by a patient in a medical facility or the like), or certain shipping instructions (e.g., rush delivery) when the band is attached to a shipped package or object. Importantly, the use of two or more identification tags 14 and/or 114 on a single flexible strap 16 does not significantly increase the overall stiffness or abrasiveness of the tag system, and thus does not significantly detract from the desired high level of user comfort.

FIG. 14 shows a plurality of identification tags 14 of the type shown in FIGS. 1-3, consolidated within a common sheet or printable form 42 for suitable processing through one or more appropriate print/programming stations. Each tag 14 is separable from the sheet 42 by means of a circumscribing perforation 134 or other suitable line of weakness. It will be recognized and understood that the any of the various identification tag embodiments shown and described herein may be provided in the printable sheet form as illustrated in FIG. 14 relative to the identification tag 14.

FIGS. 15-16 depict an alternative preferred tag system in accordance with the principles of the present invention, wherein multiple identification tags are provided in roll or printable sheet format, and in related sets adapted for bearing or carrying appropriate wearer-related identification information. Each related set of identification tags as shown includes a first tag 214 sized and shaped for mounting onto the wrist or ankle or the like of

a first person such as a mother in a medical facility environment, and at least one second tag 314 shown to have a smaller size and shape suitable for mounting onto the wrist or ankle or the like of a second person such as a newborn infant or child related to the mother.

5 More particularly, FIG. 15 depicts a succession identification tags 214 and 314 in related sets or groups, provided in the form of an elongated tape or strip 32 and interconnected by one or more separable perforations 34 or the like. Each related set or group of tags as shown includes a first, relatively large identification tag 214 having a pair of strap slots 24 formed
10 therein for slide-fit mounting onto a relatively large flexible strap 216 (FIG. 16) adapted for mounting onto an adult such as a mother in a medical facility environment. Each set or group is further shown to include at least one smaller identification tag 314, such as the pair of smaller tags 314 shown in FIG. 15, each having a pair of strap slots 24 formed therein for slide-fit
15 mounting onto a smaller flexible strap 316 (FIG. 16) sized for mounting onto a smaller person such as the mother's newborn infant. FIG. 15 illustrates two such smaller tags 314 for use, e.g., with twins. Persons skilled in the art will recognize and appreciate that the identification tags comprising each related group may be of the same or similar size, if desired.

20 The illustrated strip 32 of multiple tag sets or groups is adapted for processing through one or more appropriate printer/programmer stations, such as the print station 30 shown in FIG. 8. A locator port 38 may be formed in each set of identification tags, such as within each of the larger tags 214, thereby facilitating optical controlled advancement of the strip 32
25 through the print station or stations. Alternately, a reflector strip 40 (not shown in FIGS. 15-16) of the type depicted in FIG. 12 may be used. FIG. 15 shows each identification tag 214, 314 to include human readable information 18 and related machine readable information 20 such as bar code data. Each tag 214, 314 may additionally incorporate an RFID circuit
30 22 (not shown in FIGS. 15-16) for programmable input of wearer-related data, as previously shown and described herein.

FIG. 15 shows one preferred array for the elongated tape or strip 32, wherein each larger identification tag 214 is arranged in end-to-end relation with a successive related pair of smaller tags 314 arranged in side-by-side relation. FIG. 17 depicts a similar elongated tape or strip array, wherein the successive related pair of smaller tags 314 are arranged in parallel end-to-end relation with the associated larger identification tag 214. FIG. 18 illustrates another alternative elongated tape or strip array wherein each related set or group of larger and smaller identification tags 214, 314, is carried on a tape segment 44 having at least one locator port 38 formed therein and separable from adjacent tag sets or groups by means of lines of perforation 34 or the like. In FIG. 18, each tag set or group comprises multiple primary tags 214 and multiple secondary tags 314 for use, e.g., with straps mounted onto a mother and father associated with multiple smaller tags 314 mounted onto related infants or the like. FIG. 18 shows the tags 214, 314 bounded by additional lines of perforation 34' of the like for separation from the associated strip segment 44.

FIGS. 19-22 illustrate another alternative preferred embodiment of the invention, wherein a modified identification tag 414 includes human readable information 18 and/or machine readable data 20 and additionally includes at least one and preferably multiple detachable adhesive labels 46 bearing the same or some of this wearer-related data 18, 20. The resultant identification tag 414 including the adhesive labels 46 is adapted for quick and easy mounting onto a flexible strap 16, which is in turn adapted for quick and easy mounting onto the wrist 12 or the like of a selected person or object.

More particularly, each of the modified identification tags 414 includes a base segment 48 including the wearer-related data 18, 20, as previously described. Each modified tag 414 may also include an RFID circuit, again as previously described. The modified tag 414 further includes an extension segment 50 carrying the labels 46, wherein each label 46 may be imprinted with all or part of the wearer-related data 18, 20, and may additionally incorporate a separate RFID circuit 22. FIG. 19 shows this

modified tag 414 in elongated tape or strip form including multiple end-to-end interconnected tags 414, each with a pair of strap slots 24 and a locator port 38 formed in the base segment 48.

As shown in FIG. 20, the modified tag 414 is formed by at least one inboard ply 52 and at least one outboard ply 54, wherein these two plies 52, 54 are normally adhesively affixed at the base segment 48. However, at the extension segment 50, the labels 46 are formed in the outboard ply 54 for peel-off separation therefrom, when and as desired. That is, the outboard ply 54 has a pressure sensitive adhesive film 56 coating the entire underside or inboard surface thereof, whereas a release film or liner 58 coats an upper side of the inboard ply 52 to extend over the extension segment 50 only. With this arrangement, the two plies 52, 54 are adhesively affixed throughout the extent of the base segment 48, but the labels 46 of the extension segment 50 can be lifted or peeled one at a time for appropriate affixation to other objects to be associated with the tag wearer, such as a patient chart or treatment form, or a vial or the like containing a patient specimen, in a medical facility environment. A perforation 34 or line of weakness may be formed between the base segment 48 and extension segment 50, if desired.

FIG. 21 shows the modified tag 414 including the adhesive labels 46 slidably mounted onto a flexible strap 16 including appropriate fastening elements 26 for mounting the tag 414 onto a person's wrist or the like (as shown in FIG. 22). As viewed in FIGS. 19-21, the multiple labels 46 are arranged along the length of the extension segment 50 in side-by-side array. Alternately, as viewed in FIG. 23, the multiple labels 46 may be arranged in relatively small sets or groups oriented in end-to-end array on the extension segment 46.

FIG. 24 depicts a reader 60 for reading wearer-related information carried by the tag system 10 shown mounted onto the wrist 12 of a specific person. The illustrative reader 60 may comprise a suitable wireless communication device for non-contact communication with the RFID circuit 22 carried by the identification tag 14, and/or the reader 60 may comprise a standard bar code reader or the like for optically scanning and reading the

machine readable data 20 printed onto the tag 14. The reader 60 is shown mounted onto or associated with a turnstile 62 of the type used for authorized entry to a facility such as a concert hall, sports stadium or arena, amusement park, transportation facility, etc. Alternately, hand-held readers such as bar code readers and/or wireless transmission readers may be used for read-out of the data carried by the identification tag.

FIGURES 25-29 and 32 show one preferred form of a combination printable form 64 having at least one identification tag defined at or within a first portion 65 of the printable form, and at least one and preferably a plurality of detachable labels 46 defined at or within a second portion 66 of the printable form. In the illustrative example, the first portion 65 of the form 64 includes a pair of relatively large identification tags 514 and a pair of comparatively smaller identification tags 614, constructed generally according to the sets of identification tags shown and described previously herein with respect to FIGS. 15-18. In addition, the illustrative example shows the second portion 66 of the form 64 to include a plurality of peel-off adhesive-backed labels 46. Each of the tags 514, 614 and the labels 46 is adapted for bearing printed information thereon, such as human readable information 18 and/or machine readable information 20, all as previously described herein. Moreover, each tag 514, 614 and the labels 46 may also carry an associated RFID circuit as previously shown and described herein, wherein such RFID circuit may be embedded within each tag and label and thus is not shown in FIGS. 25-32. The printable information may be applied to the form 64 as by a single pass through a laser-type printer, or other suitable printing means which may, if desired, be incorporated into a print station 30 generally as depicted in FIG. 8.

As shown best in FIGS. 27 and 32, the first portion 65 of the printable form 64 includes a backing sheet 68 of transparent film material, overlaid with a film of substantially transparent adhesive 70 such as a pressure sensitive adhesive layer. This substrate defined by the backing sheet 68 and adhesive film 70 is secured to the rear or reverse side of a relatively stiff but somewhat flexible face ply 72. Importantly, as shown, a

major portion of a rear side of this face ply 72 carries a release film liner or coating 74, so that the face ply 72 can be peeled from the underlying adhesive film 70. However, the face ply 72 also includes printable regions 75 and 76 (FIG. 32) on the front or upper side of the face ply 72 that are not backed or rear-side coated with the release film 74, so that these printable regions 75, 76 of the face ply 74 are securely adhered by the underlying adhesive film 70 to the backing sheet 68. These printable regions 75, 76 denote and correspond respectively with the to-be-formed identification tags 514 and 614

Each printable region 75, 76 denoting one of the identification tags 514, 614, within the first portion 65 of the printable form 64, is suitably perforated or die cut as indicated at 534 (FIG. 32) for quick and easy separation from the form. By contrast, the underlying backing sheet 68 is similarly die perforated or die cut as indicated at 535, but in a bifold pattern that defines a first segment 77 directly underlying the associated tag printable region 75 or 76, and further defining along one side edge thereof a mirrored second segment 78 of similar size and shape. In addition, these perforations or die cuts in the backing sheet 68 further define strap slots 24 for subsequent mounting of the formed identification tag onto an associated strap 16 (FIGS. 30-31). Similar strap slots may also be formed into the overlying printable regions 75, 76.

With this configuration, following appropriate printing and/or programming of suitable wearer-related information onto the printable regions 75, 76 on the face ply 72, each identification tag 514, 614 can be separated from the form 64 as by rearward punch-out displacement depicted in FIG. 27. This separates the tag 514 or 614 from the first portion 65 of the printable form. In the initial state, each punched tag 514, 614 comprises the associated printable face ply region 75 or 76 adhered directly onto the underlying first segment 77 of the backing sheet 68, and also separates the adjoining second segment 78 of the backing sheet 68 from the overlying face ply 72. Importantly, the presence of the release film 74 between the face ply 72 and this second segment 78 of the backing sheet thereon permits

relatively free release of said second segment 78 with the adhesive film 70 remaining thereon. Then, as viewed in FIG. 28 relative to the larger tag 514, and in FIG. 29 relative to the smaller tag 614, the second segment 78 associated with each tag can be folded over the front side of the associated printable face ply segment 75 or 76 to form a laminated or multi-ply, and substantially moisture proof identification tag 514 or 614 having the printed information overlaid and protected by the transparent second segment 78 of the backing sheet 68. Each tag 514 and 614 can then be slidably assembled onto an associated flexible strap 16, as viewed in FIGS. 30-31.

The second portion 66 of the printable form 64 is defined by a laterally extending region of the face ply 72, at one side of the above described first portion 65 of the form 64. As shown, a perforation 34 or suitable line of weakness may be provided between these first and second portions 65, 66 to permit separation, if desired. Within the second portion 66 of the printable form 64, a reverse or rear side of the face ply 72 is backed by an adhesive film 170 or the like, such as a pressure sensitive adhesive, and a front or upper side of a backing sheet 168 (which may be opaque) is covered with a suitable release film or liner 174. A major portion of the face ply 72 defining this second portion of the printable form 64 is subdivided by perforations 134 or suitable lines of weakness into the plurality of adhesive backed labels 46.

Accordingly, subsequent to inputting the desired information to the identification tags 514, 614, and to the labels 46, the identification tags are separated from the form 64 as by punch-out displacement, and then folded per folding guide lines to finished state for mounting onto associated flexible wristband straps 16, all as previously described. The first portion 65 of the form 64 can then be separated from the second label-bearing portion 66, if desired, by tear-off separation along the perforation 34. Thereafter, the second label-bearing portion 66 may be accessed when desired to obtain a pre-printed peel-off adhesive label 46 for quick and easy affixation to objects associated or to be associated with the tags 514, 614, as previously described herein. By way of example, when the identification tag or tags are

used for patient identification in a medical facility or the like, the second portion 66 of the printable form may remain with the patient's chart or file, bearing the adhesive labels 46 ready for peel-off separation from the form portion 66 and appropriate adherence to physician's order papers, medicine
5 containers, specimen vials, medical reports, and the like.

FIGS. 33-36 shown a modified printable form 164 including a first portion 165 defining at least one identification tag, such as the illustrative bifold tags 714 and 814, and a second portion 166 defining at least one and preferably a plurality of peel-off adhesive labels 46. In this version, a
10 common backing sheet 168 (FIG. 34) which may be opaque extends throughout both form portions 165, 166, and is surface-coated with a release film or liner 174. A common face ply 72 again extends throughout both form portions 165, 166, and is rear-side coated with a suitable adhesive film 70 such as a layer of pressure sensitive adhesive or the like. Within the first
15 portion 165, multiple printable regions 175 and 176 associated respectively with the to-be-formed identification tags 714 and 814 are defined as by suitable die cuts or perforations 234 extending through the face ply 72 and underlying adhesive film 70. Such printable regions each define a mirror-image and adhesive-backed bifold tag structure adjoined along one side
20 edge. Additional die cuts or perforations formed within the printable regions 175, 176 define strap mounting slots 24.

Following printing of the desired information 18, 20, and any inputting of information to a RFID circuit which may be included therewith or therein, as previously described with the respect to the embodiment of FIGS.
25 27-32, each identification tag 714 and 814 is separated from the form 164 as by peel-off separation from the underlying backing sheet 168 and release film 174 (as viewed in FIG. 34). The tags can then be folded over along a line of weakness or suitable bifold indicator line 15, to press the adhesive film 70 on the rear sides thereof into face-to-face relation, thereby forming a multi-ply
30 identification tag for quick and easy slide-fit mounting onto a flexible wristband strap 16 or the like (not shown). While the exemplary drawings

show information printed on only one side of the folded-over tag, it will be understood that printed information may be applied to both sides, if desired.

After printing, the first portion 165 of the form 164 can be separated from the related second portion 166, as by means of an intervening perforation 34 (FIG. 33) or suitable line of weakness. Thereafter, the second label-bearing portion 166 may be accessed when desired to obtain a preprinted label 46 for affixation to objects associated or to be associated with the tags 714, 814, again as previously described herein.

A further modified printable form 264 is shown in FIG. 37, wherein this version of the invention corresponds with the embodiment shown and described in FIGS. 33-36, except that the face ply is defined by a first face ply member 172 of relatively stiff sheet stock such as a printable polyester or other printable plastic or the like to extend over the first portion 165 of the form, and a second face ply member 272 which can be formed from a relatively lighter weight and flexible, typically paper-based label stock extending over the second portion 166 of the form 264. These first and second face ply members 172 and 272 are supported in side-by-side relation by means of the common backing sheet 168. Identification tags such as the tag 914, and related peel-off labels 46 are formed and adapted for use, as previously described with respect to FIGS. 33-36.

FIGS. 38-39 illustrate a further variation of a printable form 364, wherein a backing sheet 168 is surface-coated with a release film or liner 174 over a second portion 166 of the form, but does not include the release film over the first portion 165. In this version, peel-off labels 46 with a rear-side adhesive coating 70 are again provided on the second portion 166, as defined by a die cut face ply 272 of paper-based label stock of the like. The first portion 165 of the printable form 364 can be defined by a stiffer and/or more sturdy material such as printable plastic sheet stock or the like defining the face ply 172 of said first portion 165. In this embodiment, one or more identification tags such as the tags 1014 and 1114 on said first portion 165 are defined by perimeter die cuts, perforations or line of weakness 334 or the like, in a peripheral shape corresponding to the size and shape of the final

tag. Each identification tag 1014, 1114 is adhered by the rear-side adhesive layer 70 on the face ply 172 with the underlying backing sheet 168, due to the absence of the release film 174 with the first portion 165 of the form 364.

Following the application of printed and other wearer-related information to each tag 1014, 1114 on the first portion 165 of the form 364, each identification tag can be separated as by punch-out displacement (FIG. 39) for assembly with a flexible strap or band (not shown in FIGS. 38-39). Thereafter, the first portion 165 of the form 364 can be separated along perforation or die cut 34, leaving the second portion 166 with the adhesive labels 46 thereon, as previously described herein.

FIGS. 40-41 show another variation of a printable form 464, similar to that shown and described in FIGS. 38-39, except that the backing sheet 168 has one side edge terminating a short distance beyond the associated second portion 166 of the form, and this side edge of the backing sheet 168 is secured by an adhesive lap joint or bead 80 (FIG. 41) or the like to one side edge of the first portion 165 of the printable form. A further but similar variation is shown in FIG. 42, wherein a modified printable form 564 has a backing sheet 168 connected along one side edge of the form second portion 166 by a flexible hinged web joint 180 or the like to one side edge of the form first portion 165. In the embodiments of FIGS. 40-42, the identification tags and labels are formed and adapted for use as previously described herein.

FIG. 43 illustrates a further embodiment for a printable form 664 which may correspond with any one of the prior-described embodiments shown in FIGS. 25-42, but wherein each identification tag formed on a first portion 165 of the form 664 may correspond with the label-bearing identification tag 414 as previously shown and described herein with respect to FIGS. 20-22. As shown, a second portion 166 of the printable form 664 again carries multiple peel-off labels 46.

FIG. 44 shows still another alternative embodiment for a printable form 764, wherein multiple identification tags 14 and 114 are formed on the first portion 165 of the form, with one or more of said tags 14, 114 being color coded or otherwise incorporating readily visible or readily discernable flag or

other words and/or symbols, as indicated at 115, to alert personnel regarding one or more special conditions associated with the person or object wearing the tag or tags. In this regard, the tags 14, 114 may be assembled with a common band or strap 16 as previously shown and described herein with respect to FIG. 13. Again, the second portion 166 of the printable form 764 carries multiple peel-off labels 46.

A variety of further modifications and improvements in and to the improved identification tag and related tag system of the present invention will be apparent to persons skilled in the art. For example, persons skilled in the art will recognize and appreciate that the features shown and described herein with respect to any one of the various tag embodiments and the various printable form embodiments may be employed with or in any one of the other disclosed embodiments. In addition, persons skilled in the art will understand that the identification tag and tag system, in all of its various embodiments, may be used in a wide range or different identification applications involving persons or objects, including but not limited to patient identification in a medical facility or the like, personnel identification and/or access control at secured facilities such as military or industrial installations and at prisons and the like, patron identification at amusement parks and events such as concerts and sports events and the like, airport and other transportation and passenger and/or baggage identification, identification and tracking of product and inventory and shipped parcels, and animal control, and the like. Accordingly, no limitation on the invention is intended by way of the foregoing description and accompanying drawings, except as set forth in the appended claims.